

1 (BSP July 12, 2000)

2 **Heat Curving**

3 The Contractor may use heat curving methods to fabricate specific steel  
4 components, subject to the following requirements:

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- 6 1. The steel components shall either be flange plates of welded steel  
7 plate girders, or top flange plates and longitudinal bottom flange  
8 stiffeners of welded steel box girders.  
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  - 10 2. The horizontal curvature measured to the centerline of the steel  
11 component shall be greater than or equal to 500 feet, except that  
12 the horizontal curvature dimension shall be greater than or equal  
13 to 1,000 feet if the steel component thickness exceeds 3 inches or  
14 the steel component width exceeds 30 inches. Steel components  
15 not meeting these geometric requirements shall be sheared or  
16 flame-cut to the specified geometry.  
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  - 18 3. The Contractor submits a heat curving plan to the Engineer and  
19 receives the Engineer's approval of the submittal.  
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  - 21 4. The heat curving operations shall conform to the approved heat  
22 curving plan and the requirements of this Section.  
23
  - 24 5. All heat curving shall be performed in the fabricator's shop or  
25 facility.  
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27 **Submittals**

28 The Contractor shall submit a heat curving plan to the Engineer in  
29 accordance with Section 6-03.3(7) along with the steel member  
30 fabrication shop drawings. The heat curving plan shall include, but not  
31 be limited to, the following:

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- 33 1. The methods of preparing the steel components for heat  
34 curving.  
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  - 36 2. The methods of handling and supporting the steel  
37 components during heat curving operations.  
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  - 39 3. The heating torches and tips to be used.  
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  - 41 4. The heating procedure and pattern to be used.  
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  - 43 5. The temperature measuring devices to be used to monitor the  
44 temperature of the steel component.  
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  - 46 6. The cooling methods to be used.  
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48 The Contractor shall not begin heat curving operations until receiving  
49 the Engineer's approval of the heat curving plan.  
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## **Equipment**

Heat curving shall be performed using large multiorifice (rosebud) heating torches selected as appropriate to promote heating efficiency and to prevent unnecessary distortion. The torches and tips shall be as specified in the heat curving plan as approved by the Engineer.

## **Process**

All flange butt welds for the steel component shall be completed prior to heat curving. All web butt welds shall be completed prior to connecting the web to the flange. All heat curving operations shall be completed prior to connecting the web to the flange, and prior to shop painting.

The steel components shall be handled and supported as specified in the heat curving plan as approved by the Engineer.

Only truncated triangular heating patterns shall be used. The base of the triangle shall be the edge of the steel component that is to be concave after heat curving. The heating patterns shall be spaced uniformly along the full length of both edges of the steel component to produce a circular, not parabolic, curvature. The heating patterns shall be adjusted as necessary to produce the specified curvature, compensating for differences in steel component thickness and width. Care shall be taken when heating relatively thin, wide plates to guard against buckling.

The heat curving process shall bring the temperature of the steel within the specified pattern to between 1,000F and 1,100F as rapidly as possible without overheating the steel. The heating torches shall be manipulated to prevent general and localized overheating. Heat measurements shall be made after the heating flame has been removed from the steel component.

Heat procedures that raise the temperature of any portion of the steel component above 1,100F shall be considered destructive heating. Destructive heating shall be cause for rejection of the steel component, subject to the Engineer's evaluation. Steel components damaged by destructive heating and subject to rejection may have the damaged portion repaired or replaced by the Contractor at no additional cost to the Contracting Agency, subject to the Engineer's approval of the repair and post-repair testing procedures. The repaired steel component may be accepted subject to successful post-repair testing and the Engineer's approval.

Quenching with water or water and air will not be permitted. Cooling with dry compressed air will be permitted after the steel component has cooled to 600F.